

REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Remove vendor CAGE number 50088. Add vendor, CAGE number 34355. Device type 01 not available from approved source. Add device type 04. Editorial changes throughout. Convert to military drawing format. Added case X.	1987 JULY 16	M. A. FRYE
B	Made changes to vendor part numbers. Made changes to table I, table II, 1.2.2, 3.3, 4.2, 4.3, and figures 3 and 4. Editorial changes throughout. Device type 01RX is inactive for new design. Made changes to figure 1.	1988 OCT 7	M. A. FRYE

[illegible]

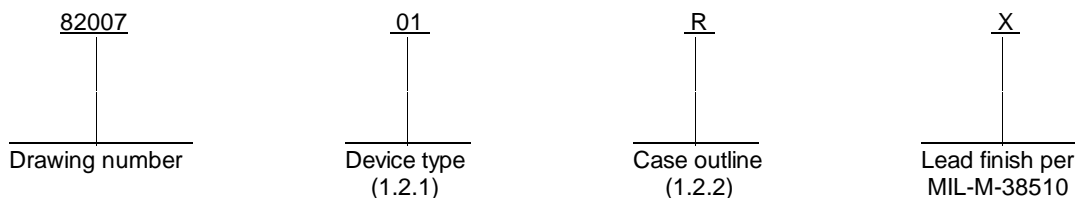
DESC FORM 193-1

5962-E856

1. SCOPE

1.1 Scope. This drawing describes device requirements for class B microcircuits in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices".

1.2 Part number. The complete part number shall be as shown in the following example:



1.2.1 Device types. The device types shall identify the circuit function as follows:

<u>Device type</u>	<u>Generic number</u>	<u>Circuit organization</u>	<u>Address access time</u>
01	4167	16,384X1 SRAM	100 ns
02	2167	16,384X1 SRAM	70 ns
03	2167	16,384X1 SRAM	55 ns
04	2167	16,384X1 SRAM	40 ns

1.2.2 Case outlines. The case outlines shall be as designated in appendix C of MIL-M-38510, and as follows:

<u>Outline letter</u>	<u>Case outlines</u>
R	D-8 (20-lead, 1.060" x .310" x .200"), dual-in-line package
X	C-13 (20-terminal, .440" x .305" x .120"), rectangular chip carrier package

1.3 Absolute maximum ratings.

V_{CC} supply voltage range	-0.5 V dc to +7.0 V dc
Storage temperature range	-65° C to +150° C
Maximum power dissipation (P_D)	1.2 W
Lead temperature (soldering, 5 seconds)	+300° C
Thermal resistance (θ_{JC})	See MIL-M-38510, appendix C
Junction temperature (T_J)	+175° C
Output short circuit current	50 mA

1.4 Recommended operating conditions.

Case operating temperature range	-55° C to +125° C
Input low voltage (V_{IL})	-2.0 V dc to 0.8 V dc
Input high voltage (V_{IH})	2.2 V dc to 6.0 V dc
V_{CC} supply voltage range	4.5 V dc to 5.5 V dc
V_{SS} supply voltage range	0 V dc

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2. APPLICABLE DOCUMENTS

2.1 Government specification and standard. Unless otherwise specified, the following specification and standard, of the issue listed in that issue of the Department of Defense Index of Specifications and Standards specified in the solicitation, form a part of this drawing to the extent specified herein.

SPECIFICATION

MILITARY

MIL-M-38510 - Microcircuits, General Specification for.

STANDARD

MILITARY

MIL-STD-883 - Test Methods and Procedures for Microelectronics.

(Copies of the specification and standard required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Order of precedence. In the event of a conflict between the text of this drawing and the references cited herein, the text of this drawing shall take precedence.

3. REQUIREMENTS

3.1 Item requirements. The individual item requirements shall be in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices" and as specified herein.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-M-38510 and herein.

3.2.1 Terminal connections. The terminal connections shall be as specified on figure 1.

3.2.2 Truth table. The truth table shall be as specified on figure 2.

3.2.3 Logic diagram. The logic diagram shall be as specified on figure 3.

3.2.4 Case outlines. The case outlines shall be in accordance with 1.2.2 herein.

3.3 Electrical performance characteristics. Unless otherwise specified, the electrical performance characteristics are as specified in table I and apply over the full case operating temperature range.

3.4 Marking. Marking shall be in accordance with MIL-STD-883 (see 3.1 herein). The part shall be marked with the part number listed in 1.2 herein. In addition, the manufacturer's part number may also be marked as listed in 6.4 herein.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions -55°C ≤ T _C ≤ +125°C V _{CC} = 4.5 V to 5.5 V V _{SS} = 0 V unless otherwise specified <u>1/</u> <u>2/</u>	Group A subgroups	Device types	Limits		Unit
					Min	Max	
Output high voltage	V _{OH}	V _{IL} = 0.8 V, V _{IH} = 2.2 V I _{OUT} = -4 mA	1,2,3	All	2.4		V
Output low voltage	V _{OL}	V _{IL} = 0.8 V, V _{IH} = 2.2 V I _{OUT} = 5 mA	1,2,3	01, 02, 03		0.4	V
Operating current	I _{CC}	t _{RC} = t _{RC} min	1,2,3	All		160	mA
Standby current	I _{SB}	$\overline{CS} = V_{IH}$ <u>3/</u>	1,2,3	All		40	mA
Input leakage current	I _{IL}	<u>4/</u>	1,2,3	All		10	uA
Output leakage current	I _{OL}	<u>5/</u>	1,2,3	All		50	uA
Input capacitance	C _{IN}	<u>6/</u> <u>7/</u>	4	All		5	pF
Output capacitance	C _{OUT}	<u>6/</u> <u>7/</u>	4	All		6	pF
Read cycle time	t _{RC}	<u>8/</u> <u>9/</u> <u>10/</u>	9,10,11	01	100		ns
				02	70		
				03	55		
				04	40		
Address access time	t _{AA}	<u>8/</u>	9,10,11	01		100	ns
				02		70	
				03		55	
				04		40	
Chip select access time	t _{CSA} (t _{ACE})		9,10,11	01		100	ns
				02		70	
				03		55	
				04		45	
Output hold from address change	t _{OH}		9,10,11	All	1		ns
Chip select to output low Z	t _{LZ}	<u>7/</u> <u>11/</u>	9,10,11	All	5		ns

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C ≤ T _C ≤ +125°C V _{CC} = 4.5 V to 5.5 V V _{SS} = 0 V unless otherwise specified 1/ 2/	Group A subgroups	Device types	Limits		Unit
					Min	Max	
Chip select to output high Z	t _{HZ}	7/ 11/	9,10,11	01,02 03 04	0 0 0	40 30 25	ns
Chip select to power up time	t _{PU}	7/	9,10,11	All	0		ns
Chip select to power down	t _{PD}	7/	9,10,11	01 02 03 04		60 55 40 30	ns
Write cycle time	t _{WC}	12/	9,10,11	01 02 03 04	100 70 55 40		ns
Chip select to end of write	t _{CW}		9,10,11	01 02 03 04	85 70 50 40		ns
Address valid to end of write	t _{AW}		9,10,11	01 02 03 04	85 70 50 40		ns
Address setup time WE controlled cycle	t _{AS1}		9,10,11	01 02,03, 04	10 5		ns
Address setup time CS controlled cycle	t _{AS2}		9,10,11	01 02,03, 04	0 5		ns
Write pulse width	t _{WP}		9,10,11	01 02 03 04	60 40 25 22		ns
Write recovery	t _{WR}		9,10,11	All	0		ns

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C ≤ T _C ≤ +125°C V _{CC} = 4.5 V to 5.5 V V _{SS} = 0 V unless otherwise specified <u>1/</u> <u>2/</u>	Group A subgroups	Device types	Limits		Unit
					Min	Max	
Data valid to end of write	t _{DW}		9,10,11	01	45		ns
				02	30		
				03	25		
				04	15		
Data hold time	t _{DH}		9,10,11	01,02, 03,04	10		ns
Write enable to output in high Z	t _{WZ}	<u>7/</u> <u>11/</u>	9,10,11	01	0	50	ns
				02	0	35	
				03	0	25	
				04	0	20	
Output active from end of write	t _{OW}	<u>7/</u> <u>11/</u>	9,10,11	All	0		ns

1/ AC measurements assume t_T = 10 ns, levels 0 V to 3 V. Input timing reference levels are at 1.5 V and output timing reference is at 1.5 V, output loading of specified I_{OL}/I_{OH} and 30 pF load capacitance. See figure 4.

2/ The operating temperature is defined as the "instant-on" case temperature.

3/ A pull-up resistor to V_{CC} on the \overline{CE} input is required to keep the device deselected during V_{CC} power up. Otherwise, I_{SB} will exceed values given.

4/ GND ≤ V_I ≤ V_{CC}.

5/ \overline{CE} = V_{IH}, GND ≤ V_O ≤ V_{CC}.

6/ Test frequency = 1.0 MHz, T_C = +25°C, all pins at 0 V, V_{CC} = 5 V.

7/ If not tested, shall be guaranteed to the limits specified on table I.

8/ The device must be selected during the previous cycle. Otherwise, t_{AA} and t_{RC} are equivalent to t_{CSA}(t_{ACS}).

9/ \overline{WE} is high for read cycles.

10/ Address valid prior to or coincident with \overline{CE} transition low.

11/ Transition is measured ±500 mV steady state voltage with load specified on figure 4 for t_{HZ}, t_{LZ}, t_{OW}, and t_{WZ}.

12/ The internal write time of the memory is defined by the overlap of \overline{CE} low and \overline{WE} low. Both signals must be low to initiate a write and either signal can terminate a write by going high. The data input setup and hold timing should be referenced to the rising edge of the signal that terminates the write.

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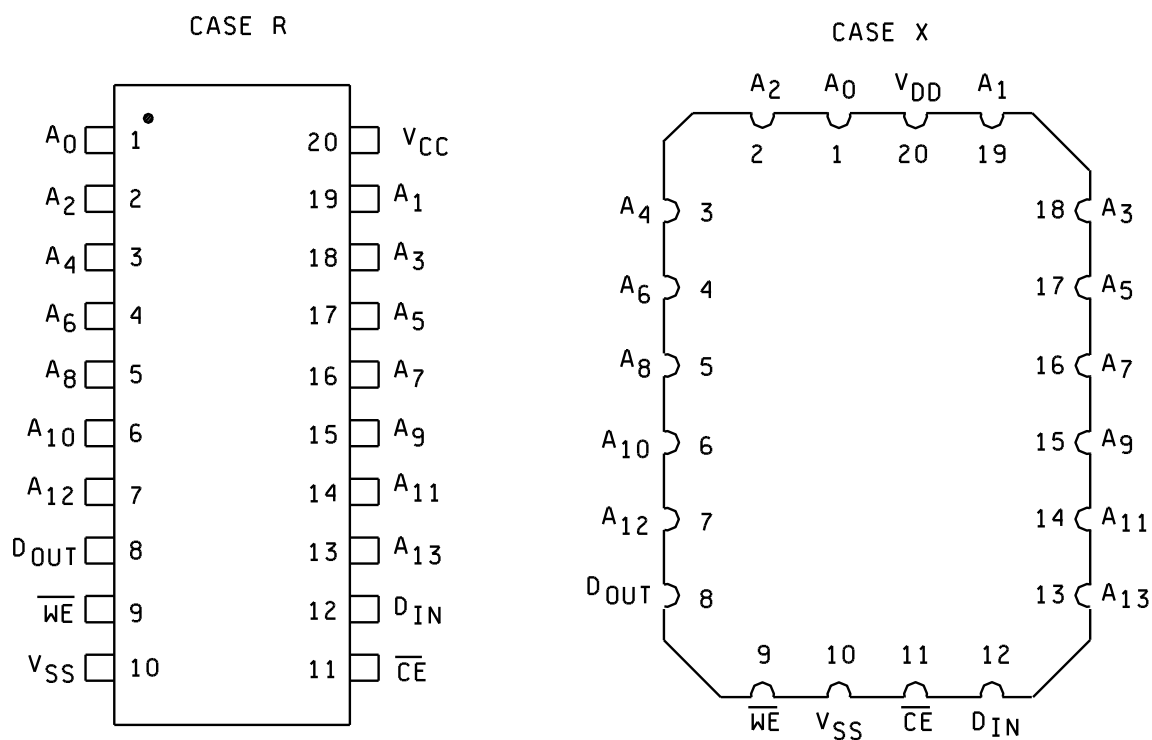


FIGURE 1. Terminal connections.

CE	WE	Mode	Output	Power
H	X	Not selected	High Z	Standby
L	L	Write	High Z	Active
L	H	Write	D _{OUT}	Active

FIGURE 2. Truth table.

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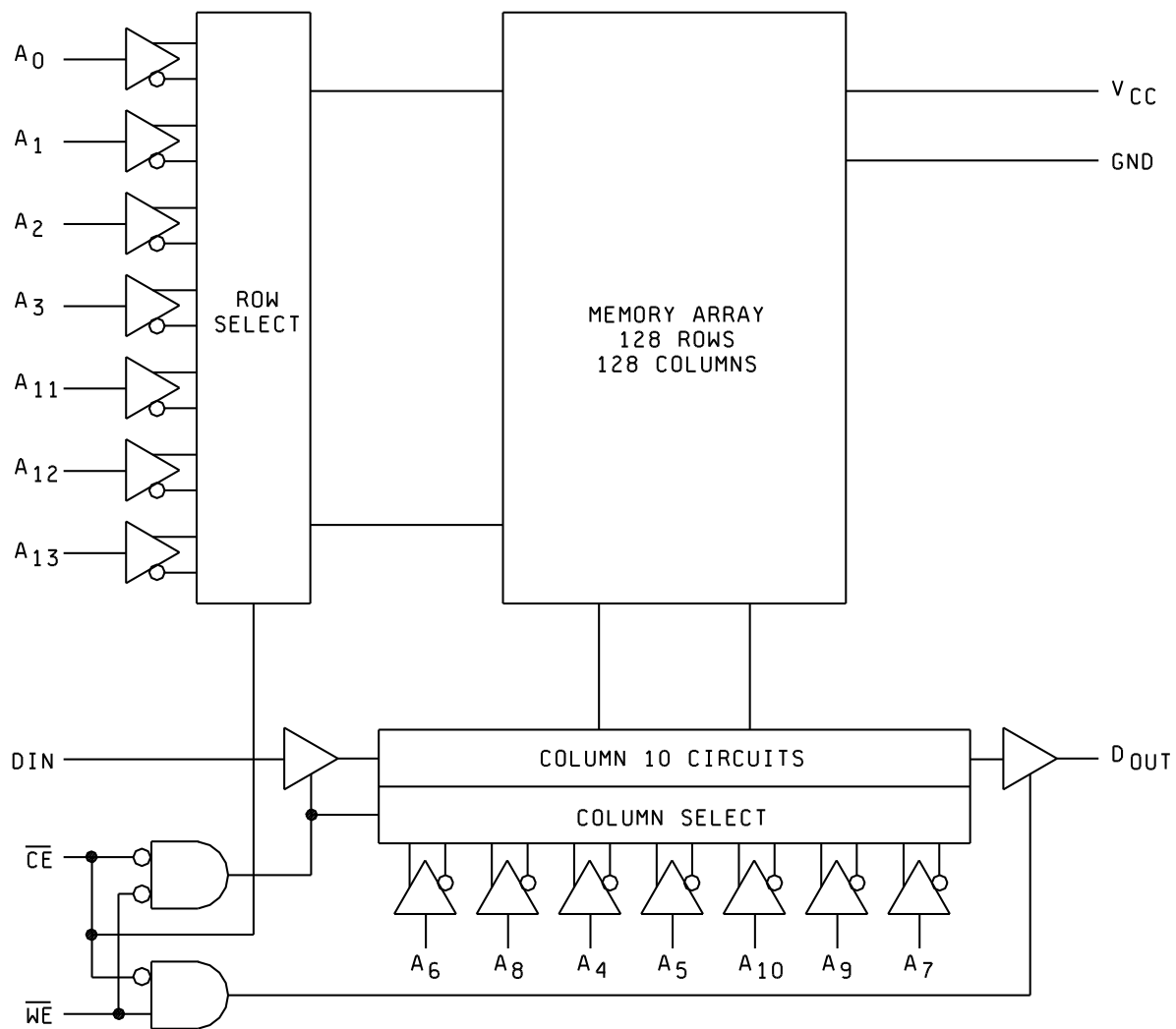


FIGURE 3. Logic diagram.

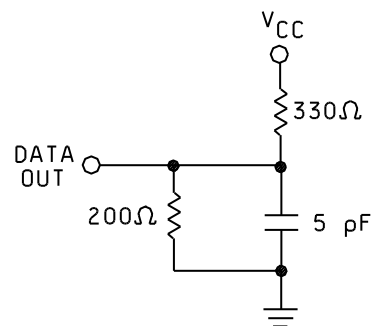
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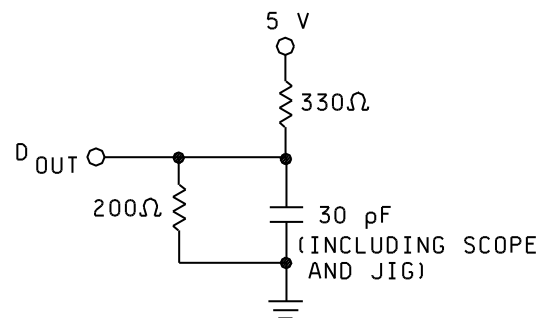
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FOR t_{HZ} , t_{LZ} , t_{OW} , AND t_{WZ}

CIRCUIT A



ALL OTHER SWITCHING PARAMETERS

CIRCUIT B

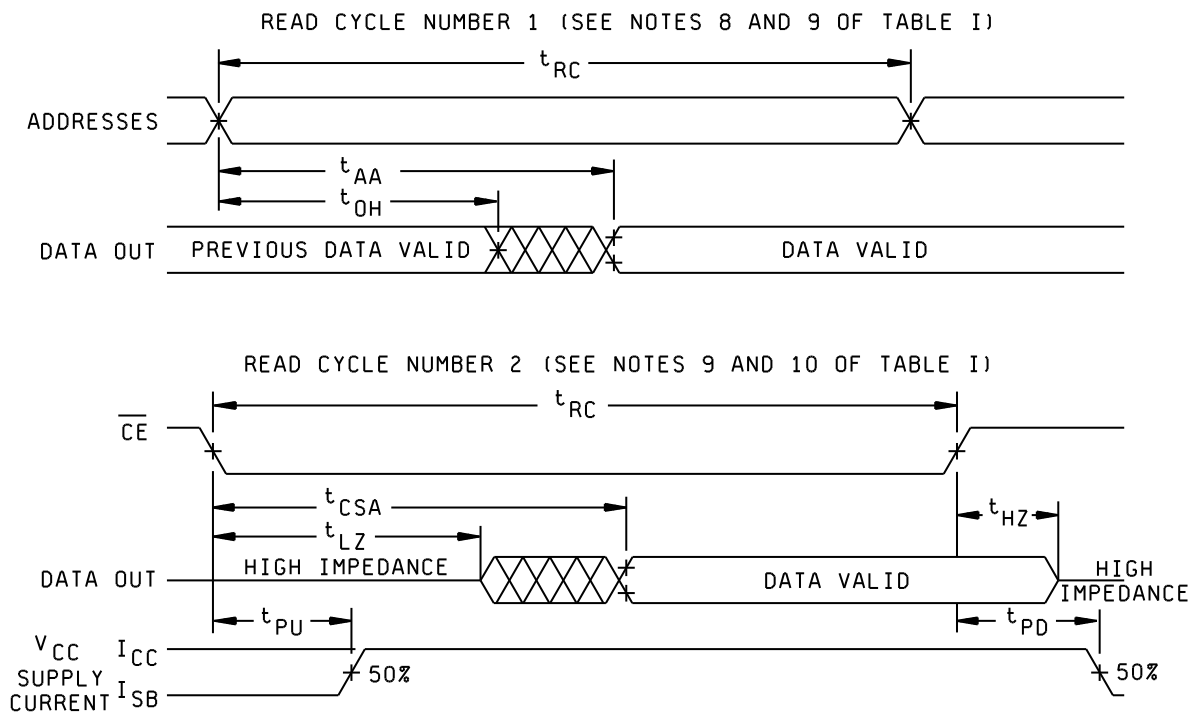


FIGURE 4. Timing Diagram.

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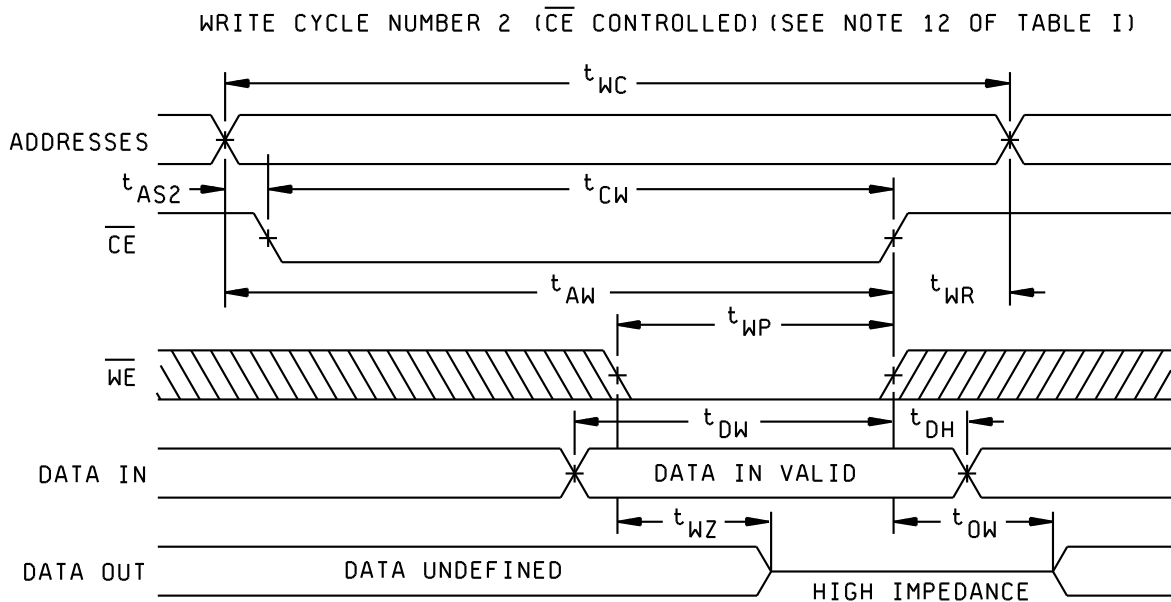
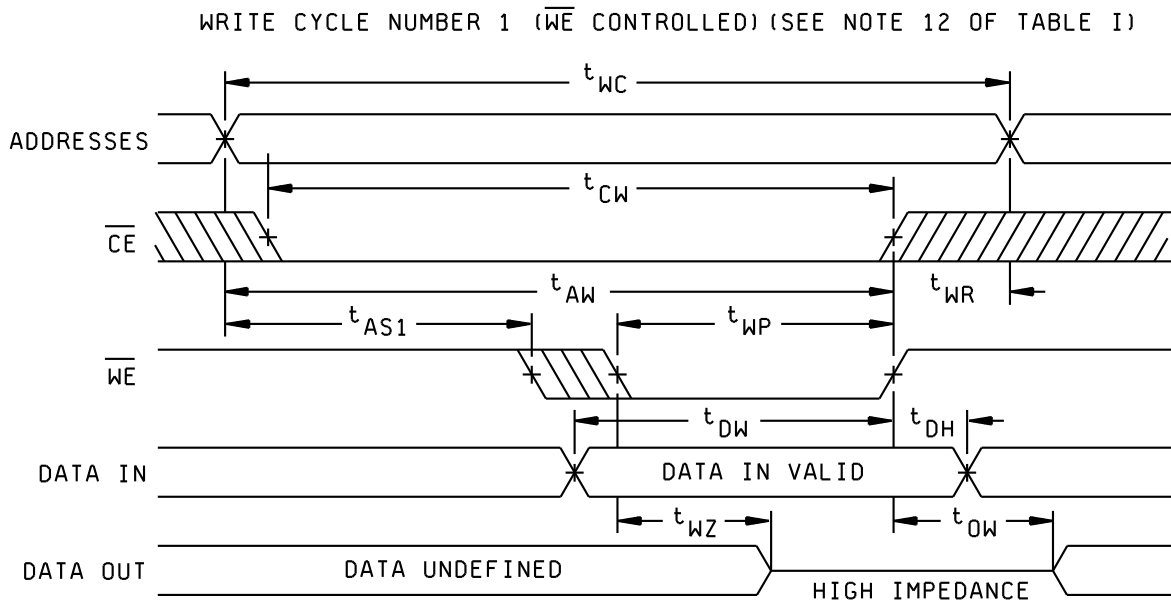


FIGURE 4. Timing Diagram - Continued.

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3.5 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to be listed as an approved source of supply in 6.4. The certificate of compliance submitted to DESC-ECS prior to listing as an approved source of supply shall state that the manufacturer's product meets the requirements of MIL-STD-883 (see 3.1 herein) and the requirements herein.

3.6 Certificate of conformance. A certificate of conformance as required in MIL-STD-883 (see 3.1 herein) shall be provided with each lot of microcircuits delivered to this drawing.

3.7 Notification of change. Notification of change to DESC-ECS shall be required in accordance with MIL-STD-883 (see 3.1 herein).

3.8 Verification and review. DESC, DESC's agent, and the acquiring activity retain the option to review the manufacturer's facility and applicable required documentation. Offshore documentation shall be made available onshore at the option of the reviewer.

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with section 4 of MIL-M-38510 to the extent specified in MIL-STD-883 (see 3.1 herein).

4.2 Screening. Screening shall be in accordance with method 5004 of MIL-STD-883, and shall be conducted on all devices prior to quality conformance inspection. The following additional criteria shall apply:

a. Burn-in test, method 1015 of MIL-STD-883.

(1) Test condition C or D using the circuit submitted with the certificate of compliance (see 3.5 herein).

(2) $T_A = +125^{\circ}\text{C}$, minimum.

b. Interim and final electrical test parameters shall be as specified in table II herein, except interim electrical parameter tests prior to burn-in are optional at the discretion of the manufacturer.

4.3 Quality conformance inspection. Quality conformance inspection shall be in accordance with method 5005 of MIL-STD-883 including groups A, B, C, and D inspections. The following additional criteria shall apply.

4.3.1 Group A inspection.

a. Tests shall be as specified in table II herein.

b. Subgroups 5 and 6 in table I, method 5005 of MIL-STD-883 shall be omitted.

c. Subgroup 4 (C_{IN} and C_{OUT} measurement) shall be measured only for the initial test and after process or design changes which may affect capacitance.

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TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (per method 5005, table I)
Interim electrical parameters (method 5004)	---
Final electrical test parameters (method 5004)	1*, 2, 3, 7, 8, 9, 10, 11
Group A test requirements (method 5005)	1, 2, 3, 4, 7, 8, 9, 10, 11
Groups C and D end-point electrical parameters (method 5005)	2, 3, 7, 8

*PDA applies to subgroup 1.

4.3.2 Groups C and D inspections.

- a. End-point electrical parameters shall be as specified in table II herein.
- b. Steady-state life test conditions, method 1005 of MIL-STD-883.
 - (1) Test condition C or D using the circuit submitted with the certificate of compliance (see 3.5 herein).
 - (2) $T_A = +125^\circ\text{C}$, minimum.
 - (3) Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

4.4 Electrostatic discharge sensitivity inspection. Electrostatic discharge sensitivity (ESDS) testing shall be performed in accordance with MIL-STD-883, method 3015, and MIL-M-38510. The option to categorize devices as ESD sensitive without performing the test is not allowed. Only those device types that pass ESDS testing at 1,000 volts or greater shall be considered as conforming to the requirements of this drawing. ESDS testing shall be measured only for initial testing and after process of design changes which may effect ESDS classification.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-M-38510.

6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for use when military specifications do not exist and qualified military devices that will perform the required function are not available for OEM application. When a military specification exists and the product covered by this drawing has been qualified for listing on QPL-38510, the device specified herein will be inactivated and will not be used for new design. The QPL-38510 product shall be the preferred item for all applications.

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6.2 Replaceability. Microcircuits covered by this drawing will replace the same generic device covered by a contractor-prepared specification or drawing.

6.3 Comments. Comments on this drawing should be directed to DESC-ECS, Dayton, Ohio 45444, or telephone 513-296-5375.

6.4 Approved source of supply. An approved source of supply is listed herein. Additional sources will be added as they become available. The vendor listed herein has agreed to this drawing and a certificate of compliance (see 3.5 herein) has been submitted to DESC-ECS.

Military drawing part number	Vendor CAGE number	Vendor similar part number <u>1/</u>
8200701RX <u>2/</u>		MKB4167-80
8200702RX 8200702XX	34335 34335	AM2167-70/BRA AM2167-70/BUA
8200703RX 8200703XX	34335 34335	AM2167-55/BRA AM2167-55/BUA
8200704RX 8200704XX	34335 34335	AM2167-45/BRA AM2167-45/BUA

1/ Caution. Do not use this number for item acquisition. Items acquired to this number may not satisfy the performance requirements of this drawing.

2/ Inactive for new design, not available from an approved source of supply.

Vendor CAGE
number

34335

Vendor name
and address

Advanced Micro Devices
P.O. Box 3453
901 Thompson Place
Sunnyvale, CA 94088

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